

The First JFET-Based Silicon Carbide Active Pixel Sensor UV Imager, Phase I

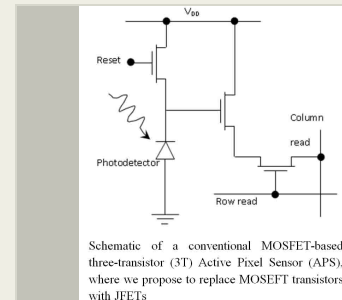
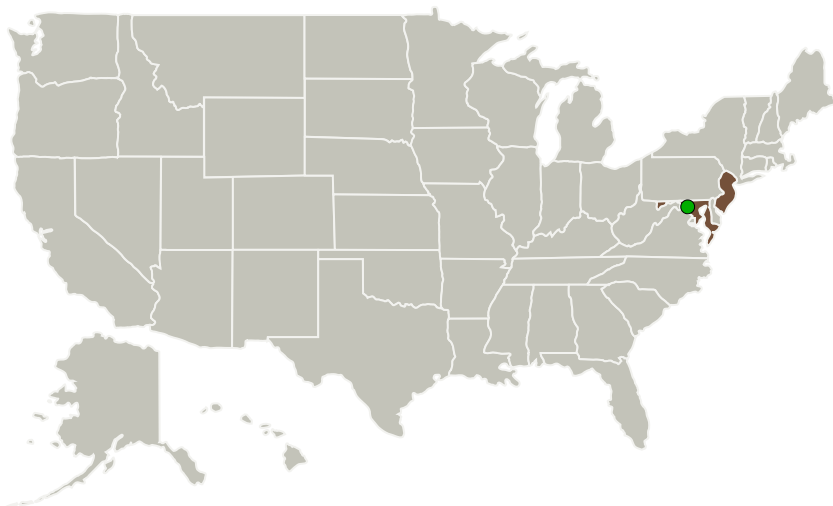
Completed Technology Project (2013 - 2013)



Project Introduction

Solar-blind ultraviolet (UV) imaging is critically important in the fields of space astronomy, national defense, and bio-chemistry. United Silicon Carbide, Inc. proposes to develop and commercialize a unique JFET-based monolithically-integrated radiation-tolerant solar blind active pixel sensor (APS) UV imager. Silicon carbide is the ideal materials system due to its negligible dark currents, excellent radiation tolerance, intrinsic insensitivity to visible and near IR light, and technological maturity. The Silicon carbide JFET is an ideal choice as an IC building block, as it is immune to the presence of stacking faults in wafer material and is free from possible threshold voltage drifting associated with the SiC MOSFET. The proposed PiN and LJFET based APS circuitry has the potential for reliable operation at temperatures exceeding 150 C. The proposed design of the active pixel sensor can be adopted for detection of more energetic particles, such as EUV and soft-X-ray, by increasing the thickness of the active low doped layer. Such APS detector arrays could be custom designed, including pixel size and epilayer thickness, and would be of nearly UNIVERSAL USE in nuclear particle detection and spectroscopy. While the active pixel sensor market is niche, applications in related Silicon Carbide LJFET based analog processes offering temperature operation above 200 C have tremendous value in the commercial, industrial & high temperature market space. LJFET IC building blocks such as voltage references, oscillators, comparators and regulators form the cell circuits for such products as PWM controllers, power transistor gate drivers, voltage regulators and amplifiers.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
United Silicon Carbide, Inc.	Lead Organization	Industry	Monmouth Junction, New Jersey
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Jersey

Project Transitions

▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138537>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

United Silicon Carbide, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Leonid Fursin

Co-Investigator:

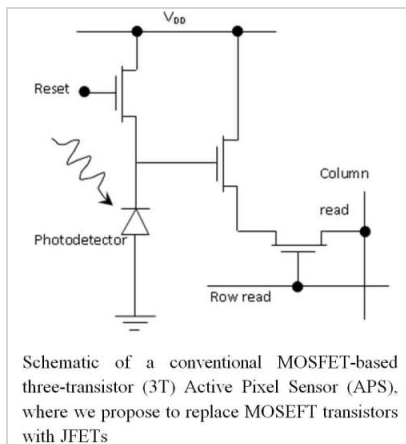
Leonid Fursin

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Images



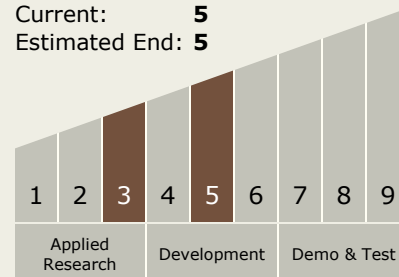
Project Image

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(<https://techport.nasa.gov/image/135374>)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System